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University Engineering Design Challenge Program

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THE UNIVERSITY OF AKRON

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Final Report

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14. ABSTRACT The University Engineering Design Challenge Program is a competition among Universities utilizing engineering seniors to bring design solution ideas to AFOSR as well as bring a structured design program for the students. Each year a problem of interest to the military is posed as a design challenge, with a competition among the design solutions occurring at the end of each year.					
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This is the final report for The University of Akron "University Engineering Design Challenge Program" for the period Sept. 2011 through July 2014.

The first year of the challenge we were tasked with designing a system to scale a 30 foot obstacle which was later changed to an 80 foot concrete silo. With very good support from the team from AFOSC our team came up with a solution utilizing a powered nail gun fixtured to attach specially designed hand/foot holds to the silo. A battery operated winch was also designed and built to rapidly lift further troops to the top once the first person arrived at the top.

The hand/foot hold devices with the nail gun worked successfully up to the point where the concrete silo ended to the point the nail gun could not penetrate the concrete. Our lift worked for the students, but was not sufficiently powered to carry the appropriate weight.

Although not as successful as we had hoped, the students gained a very good understanding of the design process and learned a tremendous amount for observing the other Universities designs.

The second year challenge was to cross a gap of up to 20 feet with a portable device. That year's team designed a portable bridge constructed from telescoping carbon fiber tubes with attached latching devices. The side tubes supported cargo netting for footing. The system worked very well allowing our team to go the full distance and return. Drawbacks included having dayglo yellow cargo netting making the bridge a visible target and attachment points for the cross support subject to breakage. One further problem noted at the competition was significant deflection which made rapid crossing less stable. If we had been concerned with this in the design we could have made the tubes a larger diameter with only a small increase in weight.

Again, The competition was organized very well and efficiently run. The students received much feedback, both positive and instructive, making the competition an extremely valuable experience.

The third year of the competition was a "heavy lift" rescue mission. Our team made a very unique system to lift the weight. It consisted of 4 ball screw jacks with a remote controller. Our team learned a valuable lesson in time management as they were finishing the construction of the controller in the hotel the night before the competition. It turns out that they did not tighten the contacts and there was sparking, so they were not able to demonstrate the operation.

As usual, the competition was very well run and many design lessons were learned not only from their own failures, but also observing the other teams compete.

From an educator's viewpoint, this program was an example of exactly how a good design competition should be run, and was a valuable learning tool in design for all students involved.